

JEE MAIN ELECTROMAGNETIC WAVES — DISPLACEMENT CURRENT AND MAXWELL'S EQUATIONS (QUALITATIVE) — PYQS

Max. Marks: 32
Questions: 8

Section A (MCQ) — 4 questions

- Q.1** A displacement current of 4.0 A can be set up in the space between two parallel plates of 6 μF capacitor. The rate of change of potential difference across the plates of the capacitor is nearly $\alpha \times 10^6$ V/s. The value of α is _____.

[JEE Main 2026 (Online) 5th April Morning Shift]

- (1) 0.58 (2) 0.67 (3) 0.82 (4) 0.75

Scan or tap for the full solution



- Q.2** Match List-I with List-II.

List-I Relation		List-II Law	
A.	$\oint \vec{E} \cdot d\vec{l} = -\frac{d}{dt} \int \vec{B} \cdot d\vec{a}$	I.	Ampere's circuital law
B.	$\oint \vec{B} \cdot d\vec{l} = \mu_0 \left(I + \epsilon_0 \frac{d\phi_E}{dt} \right)$	II.	Faraday's laws of electromagnetic induction
C.	$\oint \vec{E} \cdot d\vec{a} = \frac{1}{\epsilon_0} \int \rho \, dv$	III.	Ampere-Maxwell law
D.	$\oint \vec{B} \cdot d\vec{l} = \mu_0 I$	IV.	Gauss's law of electrostatics

Choose the correct answer from the options given below :

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) A-I, B-IV, C-III, D-II
 (2) A-II, B-III, C-IV, D-I
 (3) A-IV, B-I, C-II, D-III
 (4) A-II, B-III, C-I, D-IV

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- Q.3** If ϵ , E and t represent the free space permittivity, electric field and time respectively, then the unit of $\frac{\epsilon E}{t}$ will be :

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) Am (2) A/m (3) A/m² (4) Am²

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- Q.4** If ϵ_0 denotes the permittivity of free space and Φ_E is the flux of the electric field through the area bounded by the closed surface, then dimensions of $\left(\epsilon_0 \frac{d\Phi_E}{dt} \right)$ are that of :

[JEE Main 2025 (Online) 7th April Morning Shift]

- (1) electric charge (2) electric field
 (3) electric current (4) electric potential

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Section B (Numerical) — 4 questions

- Q.5** An electromagnetic wave of frequency 100 MHz propagates through a medium of conductivity, $\sigma = 10$ mho/m. The ratio of maximum conduction current density to maximum displacement current density is _____.

[Take $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2$]

[JEE Main 2026 (Online) 21st January Evening Shift]

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- Q.6** A parallel plate capacitor consisting of two circular plates of radius 10 cm is being charged by a constant current of 0.15 A. If the rate of change of potential difference between the plates is 7×10^8 V/s then the integer value of the distance between the parallel plates is

(Take, $\epsilon_0 = 9 \times 10^{-12} \frac{\text{F}}{\text{m}}$, $\pi = \frac{22}{7}$) _____ μm .

[JEE Main 2025 (Online) 29th January Evening Shift]

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- Q.7** A time varying potential difference is applied between the plates of a parallel plate capacitor of capacitance 2.5 μF . The dielectric constant of the medium between the capacitor plates is 1. It produces an instantaneous displacement current of 0.25 mA in the intervening space between the capacitor plates, the magnitude of the rate of change of the potential difference will be _____ V s^{-1} .

[JEE Main 2025 (Online) 23rd January Evening Shift]

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- Q.8** A parallel plate capacitor of area $A = 16 \text{ cm}^2$ and separation between the plates 10 cm , is charged by a DC current. Consider a hypothetical plane surface of area $A_0 = 3.2 \text{ cm}^2$ inside the capacitor and parallel to the plates. At an instant, the current through the circuit is 6 A . At the same instant the displacement current through A_0 is _____ mA .

[JEE Main 2025 (Online) 22nd January Evening Shift]

Scan or tap for the
full solution



ANSWER KEY

Section A (MCQ) — 4 questions

Ques.	1	2	3	4							
Ans.	2	2	3	3							

Section B (Numerical) — 4 questions

Ques.	5	6	7	8			
Ans.	1800	1320	100	1200			